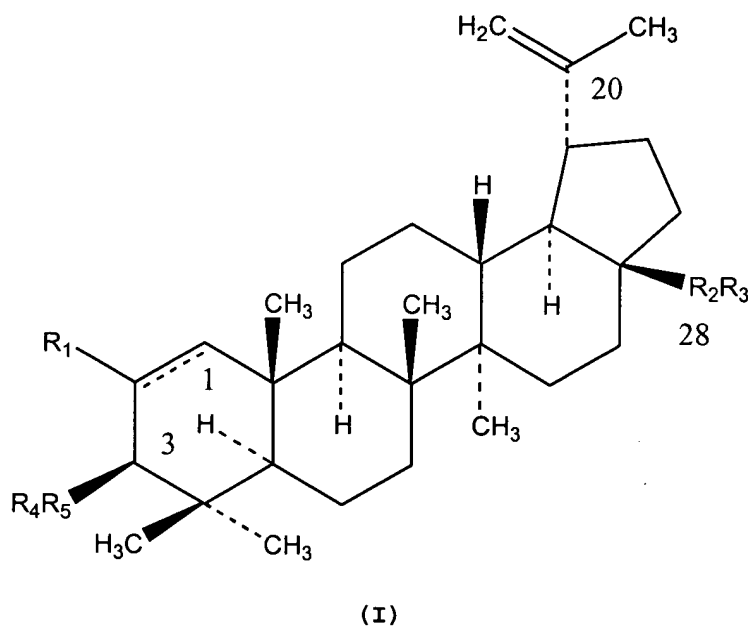


Claims

What is claimed is:

1. A pharmaceutical composition comprising a triterpene and an essential oil.
2. The composition of claim 1 wherein the triterpene is a compound of formula (I):



wherein

- 15 R_1 is hydrogen or hydroxy;
- R_2 is a direct bond, carbonyl, oxy, thio, carbonyl oxy, oxy carbonyl, (C_6-C_{10}) aryl, or (C_1-C_6) alkyl;
- R_3 is hydrogen, hydroxy, hydroxy (C_1-C_6) alkyl, (C_1-C_6) alkyl, $O=P(OH)_2$, $O=P(OH)_2OP(O)(OH)-$, (C_1-C_5) alkanoyl, $Si(R)_3$ wherein each R is H, phenyl or $(C_1-$
- 20

C₆)alkyl, C(O)N(R)₂, benzyl, benzoyl, tetrahydropyran-2-yl, 1-[(C₁-C₄)alkoxy](C₁-C₄)alkyl, or a glycoside;

R₄ is hydrogen, hydroxy, hydroxy(C₁-C₆)alkyl, (C₁-C₆)alkyl, O=P(OH)₂, O=P(OH)₂OP(O)(OH)-, (C₁-C₅)alkanoyl, Si(R)₃, wherein each R is H, phenyl or (C₁-C₆)alkyl, C(O)N(R)₂, benzyl, benzoyl, tetrahydropyran-2-yl, 1-[(C₁-C₄)alkoxy](C₁-C₄)alkyl, or a glycoside; or R₄ and R₅ together are oxo; and

R₅ is direct bond, carbonyl, oxy, thio, carbonyl oxy, oxy carbonyl, (C₆-C₁₀)aryl, or (C₁-C₆)alkyl; or R₄ and R₅ together are oxo;

wherein any alkyl can optionally be substituted with one or more halo, hydroxy, (C₆-C₁₀)aryl, nitro, cyano, (C₁-C₆)alkoxy, trifluoromethyl, polyethyleneimine, poly(ethylene glycol), oxo, NR₇R₈, wherein R₇ and R₈ are each independently hydrogen, (C₁-C₆)alkyl or polyethyleneimine; or C(=O)OR₉, wherein R₉ is hydrogen, (C₁-C₆)alkyl, or polyethyleneimine;

each of the bonds represented by --- is independently absent or is present;

wherein any alkyl is optionally interrupted on carbon with one or more oxy, thio, sulfinyl, sulfonyl, polyethyleneimine, or poly(ethylene glycol);

wherein any alkyl is optionally partially unsaturated;

wherein any aryl can optionally be substituted with one or more halo, hydroxy, nitro, cyano, (C₁-C₆)alkoxy, trifluoromethyl, polyethyleneimine, poly(ethylene glycol), oxo, NR₇R₈, wherein R₇ and R₈ are each independently hydrogen, (C₁-C₆)alkyl or

polyethyleneimine; or $C(=O)OR_9$, wherein R_9 is hydrogen,
(C_1-C_6)alkyl, or polyethyleneimine;
or a pharmaceutically acceptable salt thereof.

5 3. The composition of claim 2 wherein the bond between
carbons 1 and 2 is a single bond.

4. The composition of claim 2 wherein the bond between
carbons 1 and 2 is a double bond.

10

5. The composition of claim 2 wherein R_1 is hydrogen.

6. The composition of claim 2 wherein R_1 is hydroxy.

15 7. The composition of claim 2 wherein R_2 is a direct
bond.

8. The composition of claim 2 wherein R_3 is (C_1-
 C_6)alkyl; wherein

20 any alkyl can optionally be substituted with one or
more oxo, carboxy, amino,
-OP(=O)(OH)₂, or phenyl;

any alkyl is optionally interrupted on carbon with
one or more oxy or thio;

25 any alkyl is optionally partially unsaturated; and
any aryl can optionally be substituted with one or
more hydroxy or carboxy.

9. The composition of claim 8 wherein R_3 is
30 hydroxymethyl, (carboxymethoxy)acetoxymethyl, 4-

carboxybutanoyloxymethyl, 3-carboxypropenoyloxymethyl,
 2-carboxybenzoyloxymethyl, 3-carboxypropanoyloxymethyl,
 aminoacetoxymethyl, carboxycarbonyloxymethyl, 2-amino-3-
 methyl-butanoyloxymethyl, 4-carboxy-(3,3-
 5 dimethyl)butanoyloxymethyl, or
 $-\text{CH}_2\text{OC}(=\text{O})\text{C}(=\text{O})-(\text{-NHCH}_2\text{CH}_2)_x-[\text{-N}(\text{CH}_2\text{CH}_2\text{NH}_2)\text{CH}_2\text{CH}_2]_y$.

10. The composition of claim 2 wherein R_4 is hydrogen
 or $(\text{C}_1\text{-C}_6)\text{alkyl}$; wherein
 10 any alkyl can optionally be substituted with one or
 more oxo, carboxy, amino,
 $-\text{OP}(=\text{O})(\text{OH})_2$, or phenyl;
 any alkyl is optionally interrupted on carbon with
 one or more oxy or thio;
 15 any alkyl is optionally partially unsaturated; and
 any aryl can optionally be substituted with one or
 more hydroxy or carboxy.

11. The composition of claim 10 wherein R_4 is hydrogen,
 20 hydroxymethyl, (carboxymethoxy)acetyl, 4-
 carboxybutanoyl, 3-carboxypropenoyl, 2-carboxybenzoyl,
 3-carboxypropanoyl, aminoacetyl, carboxycarbonyl, 2-
 amino-3-methyl-butanoyl, 4-carboxy-(3,3-
 dimethyl)butanoyl, 3-carboxy-3-methylbutanoyl or -
 25 $\text{C}(=\text{O})\text{C}(=\text{O})-(\text{-NHCH}_2\text{CH}_2)_x-[\text{-N}(\text{CH}_2\text{CH}_2\text{NH}_2)\text{CH}_2\text{CH}_2]_y$.

12. The composition of claim 2 wherein R_5 is oxy.

13. The composition of claim 2 wherein R_4 and R_5
 30 together are oxo.

14. The composition of claim 2 wherein

R_1 is hydrogen or hydroxy;

R_2 is a direct bond;

5 R_3 is (C_1-C_6) alkyl;

R_4 is hydrogen or (C_1-C_6) alkyl; and

R_5 is oxy or R_4 and R_5 together are oxo;

wherein

any alkyl can optionally be substituted with one or
 10 more oxo, carboxy, amino,
 $-OP(=O)(OH)_2$, or phenyl;

any alkyl is optionally interrupted on carbon with
 one or more oxy or thio;

any alkyl is optionally partially unsaturated; and

15 any aryl can optionally be substituted with one or
 more hydroxy or carboxy.

15. The composition of claim 2 wherein

R_1 is hydrogen or hydroxy;

20 R_2 is a direct bond;

R_3 is hydroxymethyl, (carboxymethoxy)acetoxymethyl,
 4-carboxybutanoyloxymethyl, 3-carboxypropenoyloxymethyl,
 2-carboxybenzoyloxymethyl, 3-carboxypropanoyloxymethyl,
 aminoacetoxymethyl, carboxycarbonyloxymethyl, 2-amino-3-
 25 methyl-butanoyloxymethyl, 4-carboxy-(3,3-
 dimethyl)butanoyloxymethyl, or
 $-CH_2OC(=O)C(=O)-(-NHCH_2CH_2)_x-[-N(CH_2CH_2NH_2)CH_2CH_2]_y$;

R_4 is hydrogen, hydroxymethyl,
 (carboxymethoxy)acetyl, 4-carboxybutanoyl, 3-
 30 carboxypropenoyl, 2-carboxybenzoyl, 3-carboxypropanoyl,

aminoacetyl, carboxycarbonyl, 2-amino-3-methyl-butanoyl, 4-carboxy-(3,3-dimethyl)butanoyl, 3-carboxy-3-methylbutanoyl or $-C(=O)C(=O)-(-NHCH_2CH_2)_x-[-N(CH_2CH_2NH_2)CH_2CH_2]_y.$; and

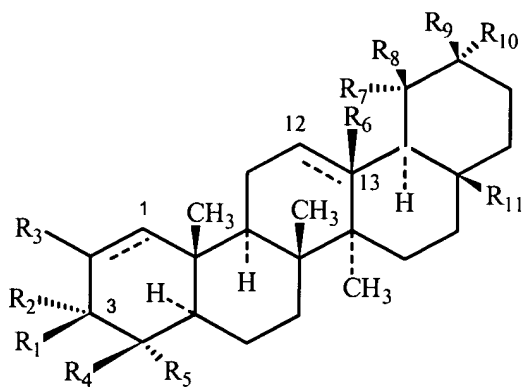
5 R_5 is oxy or R_4 and R_5 together are oxo.

16. The composition of claim 2 wherein the triterpene is betulin; betulin-3,28-diglycine; betulin-28-glycerol oxalate; betulin-28-glycine; betulin-28-oxalate; betulin
 10 arabinose galactan; betulin-3,28-diglycolate; betulin-3-maleate; betulin-3,28-di-(L-glutamic acid γ -benzylester) ester; betulin-3,28-di-L-alanine; betulin-3,28-di-L-proline ester; betulin-3,28-dioxalate; betulin-1-ene-2-ol; betulin-3,28-diphenylalanine; betulin-3,28-
 15 dioxalate-polyethylene amine; betulin-3,28-diphosphate; betulin-3-caffeate; betulin-3,28-(3',3'-dimethyl)glutarate; betulin-28-diglycolate; betulin-28-glutarate; betulin-28-maleate; betulin-28-phthalate; betulin-3,28-di(3',3'-dimethyl) glutarate; betulin-3,28-
 20 didiglycolate; betulin-3,28-dithiodiglycolate; betulin-3,28-diglutarate; betulin-3,28-dimaleate; betulin-3,28-diglycolate; betulin-3,28-diphthalate; betulin-3,28-di-L-valine ester; betulin-28-succinate; betulin-3,28-disuccinate; betulin-3,28-di-(polyethylene glycol)-COOH
 25 (Mw=1448); betulin-3,28-di-(polyethylene glycol)-COOH (Mw=906); betulin-3,28-di-(polyethylene glycol)-COOH (Mw=906); betulinic acid; betulon-1-ene-2-ol; betulin-3,28-(dipoly(ethylene glycol)bis (carboxymethylester); hederin hydrate; lupeol; lupeol-3-glutarate; lupeol-3-
 30 succinate; lupeol-3-thiodiglycolate; lupeol-3-phthalate;

oleanolic acid; ursolic acid; uvaol; betulin oxalate;
 betulin di-(L-glutamic acid γ -benzylester) ester;
 betulin-3,28-di-L-proline; betulin-3,28-diphenylalanine
 ester; betulin-3,28-phosphate; betulin-3,28-dioxalate-3-
 5 polyethyleneimine; betulin-3,28-di(3',3'-
 dimethyl)glutarate; betulin-3,28-dioxalate-3,28-
 polyethyleneimine; betulin-3,28-di-L-valine; lupeol-3-
 amine; lupeol-3-(3',3'-dimethyl)succinate; lupeol-3-
 maleate; lupenone; or lupenon-1,2-ene-2-ol.

10

17. The composition of claim 1 wherein the triterpene
 is a compound of formula (II):



(II)

15

wherein

one of R_1 and R_2 is -O-Y and the other is
 hydrogen or (C_1-C_6) alkyl optionally substituted by
 20 hydroxy, (C_1-C_6) alkoxy, halo, halo (C_1-C_6) alkoxy or NR_jR_k
 wherein R_j and R_k are independently H, (C_1-C_6) alkyl or
 (C_1-C_6) alkonyl; or R_1 and R_2 together are oxo (=O);

R_3 is hydrogen, halo, carboxy, mercapto, (C_1-C_6) alkyl, (C_3-C_8) cycloalkyl, or $-O-Y$;

R_4 and R_5 are each independently hydrogen, (C_1-C_6) alkyl, or hydroxy (C_1-C_6) alkyl;

5 R_6 is hydrogen or is absent when the adjacent -- is a bond;

R_7 is hydrogen or (C_1-C_6) alkyl;

R_8 is hydrogen, (C_1-C_6) alkyl, or hydroxy (C_1-C_6) alkyl and R_{11} is hydrogen, (C_1-C_6) alkyl, carboxy, or
10 hydroxy (C_1-C_6) alkyl; or R_8 and R_{11} together are $-O-C(=X)-$;

R_9 and R_{10} , are each independently hydrogen or (C_1-C_6) alkyl;

each of the bonds represented by --- is independently absent or is present;

15 X is two hydrogens, oxo ($=O$) or thioxo ($=S$);

each Y is independently H, aryl, $P(O)(Cl)_2$, (C_3-C_8) cycloalkyl, adamantyl, $-SO_2R_a$ $O=P(R_b)_2$,

$O=P(R_c)_2OP(O)(R_d)-$, $Si(R_e)_3$, tetrahydropyran-2-yl, an amino acid, a peptide, a glycoside, or a 1 to 10

20 membered branched or unbranched carbon chain optionally comprising 1, 2, or 3 heteroatoms selected from non-peroxide oxy, thio, and $-N(R_f)-$; wherein said chain may optionally be substituted on carbon with 1, 2, 3, or 4 oxo ($=O$), hydroxy, carboxy, halo, mercapto, nitro, -

25 $N(R_g)(R_h)$, (C_3-C_8) cycloalkyl, (C_3-C_8) cycloalkyloxy, aryl, aryloxy, adamantyl, adamantyloxy, hydroxyamino, trifluoroacetylamino, a glycoside, an amino acid, or a peptide; and wherein said chain may optionally be saturated or unsaturated (e.g. containing one, two,
30 three or more, double or triple bonds);

R_a is (C_1-C_6) alkyl or aryl;

R_b , R_c , and R_d are each independently hydroxy, (C_1-C_6) alkoxy, hydroxy (C_2-C_6) alkoxy, adamantyloxy, adamantyl (C_1-C_6) alkoxy, norbornyloxy, 1,1-di(hydroxymethyl)-2-hydroxyethoxy, carboxy (C_1-C_6) alkoxy, 2,3-epoxypropyloxy, benzyloxy, (C_3-C_8) cycloalkyloxy, NR_xR_y , or aryloxy;

R_e is H, aryl or (C_1-C_6) alkyl;

R_f is hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkanoyl, phenyl or benzyl;

R_g and R_h are each independently selected from the group consisting of hydrogen, (C_1-C_6) alkyl, hydroxy (C_1-C_6) alkyl, adamantyl, adamantyl (C_1-C_6) alkyl, amino (C_1-C_6) alkyl, aminosulfonyl, (C_1-C_6) alkanoyl, aryl and benzyl; or R_b and R_c together with the nitrogen to which they are attached form a pyrrolidino, piperidino, or morpholino radical; and

R_x and R_y are each independently hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkanoyl, aryl or benzyl;

wherein each aryl of Y, R_a-R_d , R_g-R_h , R_x , and R_y may optionally be substituted by 1, 2, or 3 aminosulfonyl, carboxy, NR_iR_j , (C_1-C_6) alkyl, (C_1-C_6) alkoxy, hydroxy, halo, nitro, cyano, mercapto, carboxy, hydroxy (C_1-C_6) alkyl, halo (C_1-C_6) alkyl, trifluoromethoxy, (C_1-C_6) alkanoyl, (C_1-C_6) alkoxycarbonyl, (C_1-C_6) alkylthio, or (C_1-C_6) alkanoyloxy; wherein R_i and R_j are each independently hydrogen, (C_1-C_6) alkyl, (C_1-C_6) alkanoyl, phenyl, or benzyl;

wherein any alkyl can optionally be substituted with one or more polyethyleneimine or

poly(ethylene glycol); and wherein any alkyl can optionally be interrupted with one or more polyethyleneimine or poly(ethylene glycol);
or a pharmaceutically acceptable salt thereof.

5

18. The composition of claim 17 wherein the bond between carbons 1 and 2 is a single bond.

19. The composition of claim 17 wherein R_1 is -O-Y and
10 Y is hydrogen, an amino acid, or (C_1-C_6) alkyl; wherein any alkyl can be optionally substituted with one or more oxo, hydroxy, amino, phenyl, or carboxy any alky can be optionally interrupted with one or more oxy or thio;
15 any phenyl can be optionally substituted with one or more hydroxy or carboxy.

20. The composition of claim 17 wherein R_1 is -O-Y and Y is hydrogen, 3-carboxypropanoyl, 4-carboxybutanoyl, or
20 2-amino-2-methylbutanoyl.

21. The composition of claim 17 wherein R_2 is hydrogen.

22. The composition of claim 17 wherein R_3 is hydrogen.
25

23. The composition of claim 17 wherein R_4 is methyl.

24. The composition of claim 17 wherein R_5 is methyl.

25. The composition of claim 17 wherein R_6 is hydrogen and the bond between carbons 12 and 13 is a single bond.

26. The composition of claim 17 wherein R_7 is hydrogen.

5

27. The composition of claim 17 wherein R_8 and R_{11} together are $-O-CH_2-$.

28. The composition of claim 17 wherein R_9 is methyl.

10

29. The composition of claim 17 wherein R_{10} is methyl.

30. The composition of claim 17 wherein

15 R_1 is $-O-Y$ and Y is hydrogen, an amino acid, or (C_1-C_6) alkyl; wherein

the alkyl of Y can be optionally substituted with one or more oxo, hydroxy, amino, carboxy, or phenyl optionally substituted with one or more hydroxy or carboxy;

20 and can be optionally interrupted with one or more oxy or thio;

R_2 is hydrogen;

R_3 is hydrogen and the bond between carbons 1 and 2 is a single bond;

25 R_4 and R_5 are each methyl;

R_6 is hydrogen and the bond between carbons 12 and 13 is a single bond;

R_7 is hydrogen

R_8 and R_{11} together are $-O-CH_2-$; and

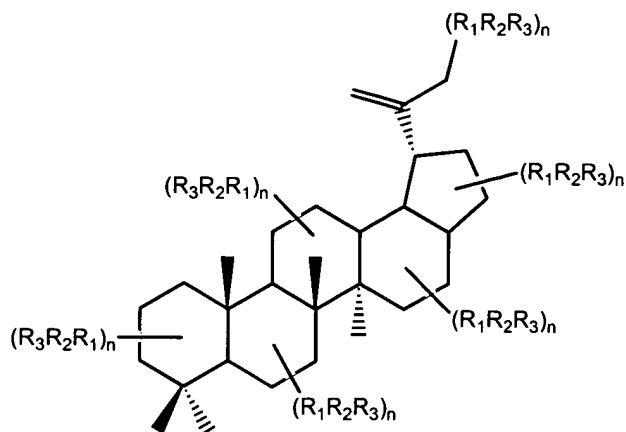
30 R_9 and R_{10} are each methyl.

31. The composition of claim 17 wherein the triterpene is 3- β -acetoxy-19 α H-19,28 lactone oleanan; allobetulin; allobetulin-3-succinate; allobetulin-3-glycine;
5 allobetulin lactone; allobetulin lactone-3-acetate; allobetulin lactone-3-phosphate; allobetulin-3-L-alanine; allobetulin-3-L-valine; allobetulin-3-L-proline; allobetulin-3-succinate; allobetulin-3-diglycolate; allobetulin-3-phthalate; allobetulin-3-
10 methylenamine; allobetulin-3-ethanolamine; allobetulin-3-glycolate; allobetulin-3-glutarate; allobetulin-28-glutarate; allobetulin-3-methylamine HCl; allobetulin-3-phosphate; allobetulin-3-(polyethylene glycol)-COOH (Mw=674); allobetulon; allobetulon lactone 1-ene-2-ol;
15 allobetulon lactone-1-en-2-succinate; allobetulon-1-ene-2-ol; allobetulon-1-ene-2-diglycolate; 3-allobetulon-1-ene-2-succinate; allobetulin-3-(poly(ethylene glycol)bis(carboxymethyl ester); or 3-allobetulon-1-ene-2-diglycolate.

20

32. The composition of claim 1 wherein the triterpene is a quaternary ammonium salt of a triterpene.

33. The composition of claim 1 wherein the triterpene
25 is a compound of formula (III):



(III)

wherein

5 each R_1 is independently absent, oxy, thio, or imino;

 each R_2 is independently absent or alkylene;

 each R_3 is independently hydrogen, N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$;

10 provided at least one R_3 is N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$;

 wherein R_a , R_b , and R_c are each independently (C_1-C_{24}) alkyl, aryl, arylalkyl, heteroarylalkyl, heterocycle, or heterocyclealkyl;

15 wherein each n is independently 0-4, provided at least one n is not 0;

 wherein any heteroaryl, heterocycle, or R_a , R_b , or R_c of R_3 can optionally be substituted on carbon with one or more alkyl, hydroxyalkyl, arylalkyl, heteroarylalkyl, aryl, heterocycle, heterocyclealkyl, oxo, hydroxy, halo, nitro, cyano, (C_1-C_6) alkoxy, trifluoromethyl, $-COOR_d$, $-NR_dR_e$, or cycloalkylalkyl;

20

wherein any cycloalkylalkyl can optionally be substituted on carbon with one or more hydroxyl, N⁺-containing heteroaryl, N⁺-containing heterocycle, or -N⁺R_aR_bR_c N⁺-containing heteroarylalkyloxy, N⁺-containing heterocyclealkyloxy, or -N⁺R_aR_bR_cOxy;

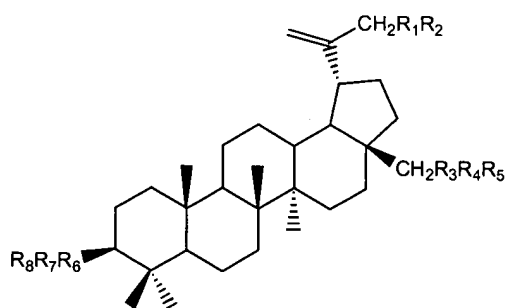
wherein R_d and R_e are each independently hydrogen or alkyl;

wherein any alkyl or alkylene of R₃ can optionally be substituted on carbon with one or more oxo, hydroxy, halo, nitro, cyano, (C₁-C₆)alkoxy, trifluoromethyl, -COOR_d, or -NR_dR_e, and optionally interrupted on carbon with one or more oxy, imino, or thio, and is optionally partially unsaturated;

or an acceptable salt thereof.

15

34. The composition of claim 1 wherein the triterpene is a compound of formula (IV):



(IV)

20

wherein

R_1 , R_4 , and R_7 are each independently absent or alkylene;

R_3 and R_6 are each independently absent, oxy, thio, or imino;

5 R_2 , R_5 , and R_8 are each independently hydrogen, N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$; provided at least one of R_2 , R_5 , and R_8 is N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$;

10 wherein R_a , R_b , and R_c are each independently (C_1 - C_{24})alkyl, aryl, arylalkyl, heteroarylalkyl, heterocycle, or heterocyclealkyl;

 wherein any heteroaryl, heterocycle, R_a , R_b , or R_c of R_2 , R_5 , and R_8 can optionally be substituted on carbon
15 with one or more alkyl, hydroxyalkyl, arylalkyl, heteroarylalkyl, aryl, heterocycle, heterocyclealkyl, oxo, hydroxy, halo, nitro, cyano, (C_1 - C_6)alkoxy, trifluoromethyl, $-COOR_d$, $-NR_dR_e$, or cycloalkylalkyl;

 wherein any cycloalkylalkyl can optionally be
20 substituted on carbon with one or more hydroxyl, N^+ -containing heteroaryl, N^+ -containing heterocycle, $-N^+R_aR_bR_c$, N^+ -containing heteroarylalkyloxy, N^+ -containing heterocyclealkyloxy, or $-N^+R_aR_bR_c$ oxy;

 wherein R_d and R_e are each independently hydrogen or
25 alkyl;

 wherein any alkyl or alkylene of R_1 , R_2 , R_4 , R_5 , R_7 , or R_8 can be optionally substituted on carbon with one or more oxo, hydroxy, halo, nitro, cyano, (C_1 - C_6)alkoxy, trifluoromethyl, $-COOR_d$, or $-NR_dR_e$, and optionally

interrupted on carbon with one or more oxy, imino, or thio, and is optionally partially unsaturated;
or an acceptable salt thereof.

- 5 35. The composition of claim 34 wherein R_2 , R_5 , and R_8 are each independently absent, hydroxyl, N-diazabicyclo[2.2.2]octyl, N-pyridinium, N-alkyl-N-piperidino, N-alkyl-N-morpholino, N-azabicyclo[2.2.2]octyl, or $-NR_aR_bR_c$; provided at least
10 one of R_2 , R_5 , and R_8 is N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$;

wherein N-diazabicyclo[2.2.2]octyl; N-pyridinium; N-alkyl-N-piperidino; N-alkyl-N-morpholino; and N-azabicyclo[2.2.2]octyl can optionally be substituted on
15 one or more suitable carbon atoms with one or more oxo, hydroxy, mercapto, alkyl, hydroxyalkyl, halo, nitro, cyano, (C_1-C_6) alkoxy, $-COOR_d$, or $-NR_dR_e$;

wherein any alkyl or alkylene of R_1 , R_2 , R_4 , R_5 , R_7 , or R_8 can optionally be substituted with one or more oxo
20 or $-NR_dR_e$, and optionally interrupted with one or more oxy, imino, or thio, and can optionally be partially unsaturated.

36. The composition of claim 34 wherein R_1 is absent
25 and R_2 is hydrogen, N-diazabicyclo[2.2.2]octyl, or N-dimethylamino-N-pyridinium.

37. The composition of claim 34 wherein R_3 and R_4 are absent, and R_5 is hydrogen.

38. The composition of claim 34 wherein

R₃ is oxy;

R₄ is absent or (C₁-C₅)alkylenecarbonyl; and

R₅ is hydrogen, N-diazabicyclo[2.2.2]octyl; 4-
5 dimethylamino-N-pyridinium; 4-hydroxybutyl-N-
diazabicyclo[2.2.2]octyl; 4-benzyl-N-
diazabicyclo[2.2.2]octyl; tetramethylethylenediamine-N-
yl; N'-benzyl-N,N,N',N'-tetramethylethylenediamine-N-yl;
N-pyridinium; 4-hydroxymethyl-N-pyridinium; 2,4-
10 dimethyl-N-pyridinium; 3,5-dimethyl-N-pyridinium;
octyldimethylammonium; or tetradecyldimethylammonium.

39. The composition of claim 34 wherein

R₆ is oxy;

15 R₇ is absent or (C₁-C₅)alkylenecarbonyl; and

R₈ is hydrogen, N-diazabicyclo[2.2.2]octyl; 4-
dimethylamino-N-pyridinium; N'-(4-hydroxybutyl)-N-
diazabicyclo[2.2.2]octyl; N'-benzyl-N-
diazabicyclo[2.2.2]octyl; N,N,N',N'-
20 tetramethylethylenediamine-N-yl; N'-benzyl-N,N,N',N'-
tetramethylethylenediamine-N-yl; N-pyridinium; 4-
hydroxymethyl-N-pyridinium; 2,4-dimethyl-N-pyridinium;
3,5-dimethyl-N-pyridinium; octyldimethylammonium;
tetradecyldimethylammonium; 2-methyl-N-pyridinium; 4-
25 hydroxy-N-methyl-N-piperidinium; or N-methyl-N-
morpholino.

40. The composition of claim 1 wherein the triterpene
is

30 lup-20(29)-ene-3,28-bis-(N-pyridiniumacetate);

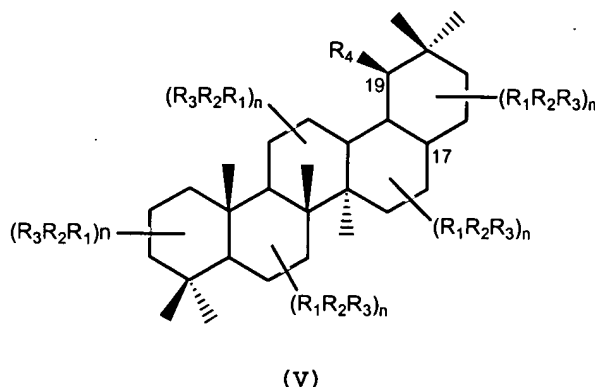
- lup-20(29)-ene-3-[N-(4-oxybutyl)-1,4-diazabicyclo[2.2.2]octyl-N'-acetate];
- lup-20(29)-ene-3,28-bis[N-(1,4-diazabicyclo[2.2.2]octyl)acetate];
- 5 lup-20(29)-ene-3,28-bis[N-(N'-benzyldiazabicyclo[2.2.2]octyl)acetate];
- lup-20(29)-ene-3,28-bis[N-(N'-(4-oxybutyl)diazabicyclo[2.2.2]octyl)acetate];
- lup-20(29)-ene-3-[N-(1,4-diazabicyclo[2.2.2]octyl)acetate];
- 10 lup-20(29)-ene-3,28-bis[(tetramethylethylenediamine-N-yl)acetate];
- lup-20(29)-ene-3,28-bis[(N'-benzyl-N,N,N',N'-tetramethylethylenediamine-N-yl)acetate];
- 15 lup-20(29)-ene-3-[N-(N'-(benzyl)diazabicyclo[2.2.2]octyl)acetate];
- bis(N,N'-pyridinium-2-ethyl)lup-20(29)-ene-3,28-dicarbamate;
- 1-(3,28-(diacetoxy)lup-20(29)-ene-30-yl)-4-(dimethylamino)pyridinium;
- 20 lup-20(29)-ene-3,28-bis(N-pyridinium-2-propionate);
- lup-20(29)-ene-3,28-bis(N-pyridinium-3-propionate);
- lup-20(29)-ene-3,28-bis(N-pyridinium-4-butyrate);
- lup-20(29)-ene-3,28-bis(N-pyridinium-4-butyrate);
- 25 lup-20(29)-ene-3,28-bis(N-pyridinium-2-butyrate);
- 1-[3,28-(diacetoxy)lup-20(29)-ene-30-yl]-1,4-diazabicyclo[2.2.2]octyl;
- 3,28-bis[3-(1-piperidinyl)propanoyloxy]lup-20(29)-ene;
- 1-(3,28-dihydroxylup-20(29)ene-30-yl)-4-(dimethylamino)pyridinium;
- 30

- lup-20(29)-ene-3,28-bis[N-(4-dimethylaminopyridinium)-2-propionate];
- lup-20(29)-ene-3,28-bis[N-(1,4-diazabicyclo[2.2.2]octyl)-2-propionate];
- 5 1-(lup-20(29)-ene-30-yl)-1,4-diazabicyclo[2.2.2]octane;
1-(3,28-dihydroxylup-20(29)-ene-30-yl)-pyridinium;
lup-20(29)-ene-3,28-bis[N-(1,4-diazabicyclo[2.2.2]octyl)-4-butyrate];
1-(3,28-dihydroxylup-20(29)-ene-30-yl)-[N-3-
- 10 (hydroxymethyl)pyridinium];
1-(3,28-dihydroxylup-20(29)-ene-30-yl)-[N-(3,5-dimethylpyridinium)];
bis[N-(1,4-diazabicyclo[2.2.2]octyl)-2-ethyl]-lup-20(29)-ene-3,28-dicarbamate;
- 15 lup-20(29)-ene-3,28-bis[N-(3-oxymethylpyridinium)acetate];
lup-20(29)-ene-3,28-bis[N-(2-oxymethylpyridinium)acetate];
lup-20(29)-ene-3,28-bis[N-(2-
- 20 methylurea)pyridinium)acetate];
lup-20(29)-ene-3-[N-(2-oxymethylpyridinium)acetate];
lup-20(29)-ene-3,28-bis[N-(N-methylmorpholino)acetate];
lup-20(29)-ene-3,28-bis[N-(4-hydroxyl-N-methylpiperidino)acetate];
- 25 lup-20(29)-ene-3-[N-(3-ureamethylpyridinium)acetate];
lup-20(29)-ene-3-(N-pyridinium)acetate];
lup-20(29)-ene-3,28-bis[N-(1,4-
- diazabicyclo[2.2.2]octyl)-2-butyrate];
lup-20(29)-ene-3,28-bis[N-(4-dimethylpyridinium)-2-
- 30 butyrate];

- lup-20(29)-ene-3,28-bis[N-(4-dimethylaminopyridinium)-4-butyrates];
- lup-20(29)-ene-3,28-bis[N-(4-dimethylaminopyridinium)-3-propionate];
- 5 1-(3,28-dihydroxylup-20(29)-ene-30-yl)-4-(hydroxymethyl)pyridinium;
- 1-(3,28-dihydroxylup-20(29)-ene-30-yl)-3-hydroxy-1-azabicyclo[2.2.2]octane;
- lup-20(29)-ene-3,28-bis[N-(2,4-
- 10 dimethylpyridinium)acetate];
- lup-20(29)-ene-3,28-bis[N-(3,5-dimethylpyridinium)acetate];
- lup-20(29)-ene-3,28-bis[N-(4-dimethylaminopyridinium)acetate];
- 15 lup-20(29)-ene-3-[N-(2-methylpyridinium)acetate];
- lup-20(29)-ene-3-[N-(2,4-dimethylpyridinium)acetate];
- lup-20(29)-ene-3-[N-(4-hydroxy-N-methylpiperidino)acetate];
- lup-20(29)-ene-3-[N-(N-methylmorpholino)acetate];
- 20 lup-20(29)-ene-3-[N-(3,5-dimethylpyridinium)acetate];
- lup-20(29)-ene-3-[N-(4-dimethylaminopyridinium)acetate];
- lup-20(29)-ene-3,28-bis(octyldimethylammoniumacetate);
- lup-20(29)-ene-3-octyldimethylammoniumacetate;
- lup-20(29)-ene-3,28-
- 25 bis(tetradecyldimethylammoniumacetate);
- lup-20(29)-ene-3-tetradecyldimethylammoniumacetate;
- N,N,N',N'-tetramethylethylenediamine-N,N'-bis-[lup-20(29)-ene-3-acetate];
- 1-[(lup-20(29)-ene-3-yl)oxycarbonylmethyl]-4-aza-1-
- 30 azonia-bicyclo[2.2.2]octane;

1-[(lup-20(29)-en-3-yl)oxycarbonylmethyl]trimethylammonium; or
 1-[(lup-20(29)-en-3-yl)oxycarbonylmethyl]pyridinium.

- 5 41. The composition of claim 1 wherein the triterpene is a compound of formula (V):



10

wherein

each R_1 is independently absent, oxy, thio, or imino;

each R_2 is independently absent or alkylene;

- 15 each R_3 is independently hydrogen, N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$; provided at least one R_3 is N^+ -containing heteroaryl, N^+ -containing heterocycle, or $-N^+R_aR_bR_c$;

R_4 is hydrogen, alkyl, or hydroxyalkyl;

- 20 or R_4 together with one $R_1R_2R_3$ forms a $-OCH_2-$ bridging carbons 19 and 17;

wherein R_a , R_b , and R_c are each independently (C_1 - C_{24})alkyl, aryl, arylalkyl, heteroarylalkyl, heterocycle, or heterocylealkyl;

wherein each n is independently 0-4, provided at least one n is not 0;

wherein any heteroaryl, heterocycle, or R_a , R_b , or R_c of R_3 can optionally be substituted on carbon with one or more alkyl, hydroxyalkyl, arylalkyl, heteroarylalkyl, aryl, heterocycle, heterocyclealkyl, oxo, hydroxy, halo, nitro, cyano, (C_1-C_6) alkoxy, trifluoromethyl, $-COOR_d$, $-NR_dR_e$, or cycloalkylalkyl;

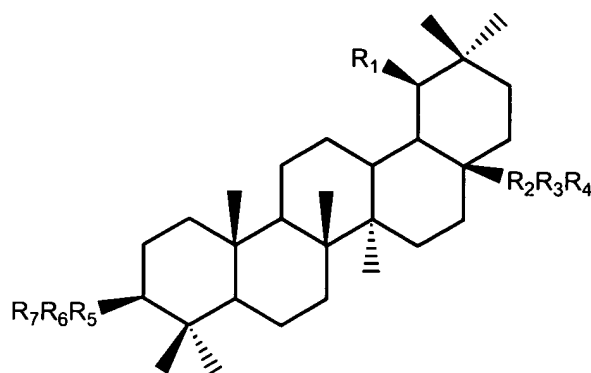
wherein any cycloalkylalkyl can optionally be substituted on carbon with one or more hydroxyl, N^+ -containing heteroaryl, N^+ -containing heterocycle, $-N^+R_aR_bR_c$, N^+ -containing heteroarylalkyloxy, N^+ -containing heterocyclealkyloxy, or $-N^+R_aR_bR_c$ oxy;

wherein R_d and R_e are each independently hydrogen or alkyl;

wherein any alkyl or alkylene of R_3 can optionally be substituted on carbon with one or more oxo, hydroxy, halo, nitro, cyano, (C_1-C_6) alkoxy, trifluoromethyl, $-COOR_d$, or $-NR_dR_e$, and optionally interrupted on carbon with one or more oxy, imino, or thio, and is optionally partially unsaturated

or an acceptable salt thereof.

42. The composition of claim 1 wherein the triterpene is a compound of formula (VI)



(VI)

wherein

- 5 R_1 is hydrogen, alkyl, or hydroxyalkyl,
 R_2 is oxymethylene, thiomethylene, iminomethylene,
 or methylene;
 R_3 and R_6 are each independently absent or alkylene;
 R_4 and R_7 are each independently hydrogen, N^+ -
 10 containing heteroaryl, N^+ -containing heterocycle, or
 $-NR_aR_bR_c$; provided at least one of R_4 and R_7 is N^+ -
 containing heteroaryl, N^+ -containing heterocycle, -
 $NR_aR_bR_c$; or R_1 , R_2 , R_3 , and R_4 are together $-O-C(=X)-$;
 wherein X is two hydrogens, oxo, or thioxo ($=S$);
 15 wherein R_a , R_b , and R_c are each independently (C_1 -
 C_{24})alkyl, aryl, arylalkyl, heteroarylalkyl, heterocycle,
 or heterocyclealkyl;
 wherein R_5 is absent, oxy, thio, or imino;
 wherein any heteroaryl, heterocycle, or R_a , R_b , or
 20 R_c of R_4 and R_7 can optionally be substituted on carbon
 with one or more alkyl, hydroxyalkyl, arylalkyl,
 heteroarylalkyl, aryl, heterocycle, heterocyclealkyl,

oxo, hydroxy, halo, nitro, cyano, (C₁-C₆)alkoxy, trifluoromethyl, -COOR_d, -NR_dR_e, or cycloalkylalkyl;

wherein any cycloalkylalkyl can optionally be substituted on carbon with one or more hydroxyl, N⁺-containing heteroaryl, N⁺-containing heterocycle, -N⁺R_aR_bR_c, N⁺-containing heteroarylalkyloxy, N⁺-containing heterocyclealkyloxy, or -N⁺R_aR_bR_cOxy;

wherein R_d and R_e are each independently hydrogen or alkyl;

wherein any alkyl or alkylene of R₃, R₄, R₆, or R₇ can be optionally substituted on carbon with one or more oxo, hydroxy, halo, aryl, nitro, cyano, (C₁-C₆)alkoxy, trifluoromethyl, COOR_d, or -NR_dR_e, and optionally interrupted on carbon with one or more oxy, imino, or thio, and is optionally partially unsaturated; or an acceptable salt thereof.

43. The composition of claim 42 wherein

R₁ is hydrogen, alkyl, or hydroxyalkyl,

R₂ is oxymethylene, thiomethylene, iminomethylene, or methylene;

R₃ and R₆ are each independently absent or (C₁-C₅)alkylenecarbonyl;

R₄ and R₇ are each independently hydrogen, N-diazabicyclo[2.2.2]octyl; N-pyridinium; N-alkyl-N-piperidino; N-alkyl-N-morpholino; N-azabicyclo[2.2.2]octyl; or NR_aR_bR_c;

or R₁, R₂, R₃, and R₄ are together -O-CH₂-;

wherein N-diazabicyclo[2.2.2]octyl; N-pyridinium; N-alkyl-N-piperidino; N-alkyl-N-morpholino; and N-

azabicyclo[2.2.2]octyl can optionally be substituted on carbon with one or more alkyl, hydroxyalkyl, hydroxy, COOR_d, or NR_dR_e;

wherein R_a, R_b, and R_c are each independently aryl
 5 or (C₁-C₂₄)alkyl; wherein R_d and R_e are each independently hydrogen or alkyl;

wherein any alkylene or alkyl can optionally be substituted on carbon with one or more oxo, hydroxy, halo, nitro, cyano, trifluoromethyl, COOR_d, or -NR_dR_e,
 10 and optionally interrupted with one or more oxy, imino, or thio, and where any alkyl or alkylene can optionally be partially unsaturated.

44. The composition of claim 42 wherein R₁, R₂, R₃, and
 15 R₄ are together -O-CH₂-.

45. The composition of claim 42 wherein R₅ is oxy.

46. The composition of claim 42 wherein R₆ is acetyl.
 20

47. The composition of claim 42 wherein R₇ is N-diazabicyclo[2.2.2]octyl; N-pyridinium; or -N⁺(CH₃)₃.

48. The composition of claim 42 wherein the cation of
 25 the compound is

1-[(19,28-epoxy-18-oleanan-3-yl)oxycarbonylmethyl]-4-aza-1-azonia-bicyclo[2.2.2]octane;
 [(19,28-epoxy-18-oleanan-3-yl)oxycarbonylmethyl]trimethylammonium; or

1-[(19,28-epoxy-18-oleanan-3-yl)oxycarbonylmethyl]pyridinium.

49. The composition of claim 1 wherein the triterpene
5 is present up to about 30 wt.% of the composition.

50. The composition of claim 1 wherein the triterpene
is present up to about 20 wt.% of the composition.

10 51. The composition of claim 1 wherein the triterpene
is present up to about 10 wt.% of the composition.

52. The composition of claim 1 wherein the triterpene
is present up to about 5 wt.% of the composition.

15

53. The composition of claim 1 wherein the essential
oil is at least one of ajowan, almond oil, sweet almond
oil, allspice, aloe vera oil, ammi visnaga (khella),
amyris, angelica root, angelica seed, anise, anise seed,
20 star anise, apricot kernel oil, absolute arnica, avocado
oil, unrefined avocado oil, Copaiba balsam, balsam Peru
genuine, balsam Peru oil, balsam peru liquid resin,
balsam tolu, sweet french basil, basil, basil ct. methyl
chavicol, lemon ct. citral basil, sweet ct. linalool
25 basil, bay laurel, bay leaf, bay rum, bay leaf West
Indies, bees wax, unrefined bees wax, benzoin absolute,
benzoin resinoid, bergamot, mint bergamot, Italian
bergamot oil, free bergaptene bergamot, birch, sweet
birch, borage oil, boronia, butter, buchu leaf, cajeput,
30 calamus, calendula oil, infused calendula oil, camellia

- oil, camphor, cannabis, caraway, caraway seed, cardamom, absolute carnation, carrot seed, high carotol carrot seed, carrot seed oil, cassia, cassis bud (black currant), castor oil, catnip, oil of catnip, cedarleaf, 5 western red cedarleaf, cedarwood, Atlas cedarwood, Himalayan cedarwood, Virginia cedarwood, celery seed, chamomile, blue chamomile, German chamomile, Moroccan chamomile, Moroccan wild chamomile, Roman chamomile, champaca, cilantro, true cinnamon bark, cinnamon bark, 10 cinnamon leaf, cinnamon cassia, cistus, citronella, Java citronella, ciste oil, artificial civet, clary sage, high sclareol clary sage, clementine, Italian clementine peel oil, clove, clove bud, clove leaf, cocoa, cocoa butter, unrefined cocoa butter, coconut oil, refined 15 coconut oil, cognac, coltsfoot, combava petitgrain, coriander, green coriander, cornmint, costus oil, cumin, cypress, davana oil, dill, dill weed, elemi, ephedra, erigeron (fleabane), eucalyptus, eucalyptus citriodora, eucalyptus globulus, lemon eucalyptus, fennel, sweet 20 fennel, fenugreek, fir, fir needle oil, Canada fir needle, Siberia fir needle, white fir needle, frankincense, India frankincense, Oman frankincense, galbanum oil, garlic, genet, geranium, geranium leaf, geranium rose, Bourbon geranium, Egyptian geranium, 25 ginger, Cochin extra ginger, ginseng, Siberian ginseng, Korean ginseng, grapefruit, pink grapefruit, white grapefruit, grapeseed oil, hazelnut oil, helichrysum, helichrysum immortelle, Mad. helichrysum, Balkan helichrysum, Corsica helichrysum, France helichrysum, 30 hemp oil, absolute honeysuckle, hyssop, hyssop

decumbens, absolute immortelle, fragrant aster inula,
 Jamaican gold, unrefined Jamaican gold, jasmine,
 absolute jasmine, grandiflorum jasmine, sambac jasmine,
 jojoba oil, helio-carrot in jojoba, melissa in jojoba,
 5 absolute jonquille, juniper berry, Siberia juniper
 berry, Croatia juniper berry, lanolin, unrefined
 anhydrous lanolin, lantana camara, laurel nobilis,
 lavandin, abrialis lavandin, grosso lavandin, lavender,
 Oregon lavender, Bulgarian lavender, Russian lavender,
 10 high-altitude lavendar, wild-crafted lavender, lavandin,
 organic lavandin, lemon, lemongrass, lime, distilled
 lime, expressed lime, litsea, litsea cubeba, blue, pink
 and white lotus, macadamia oil, mace, green mandarin,
 red mandarin, yellow mandarin, manuka, absolute
 15 marigold, marigold flower, marjoram, Spanish marjoram,
 sweet marjoram (true), massoia bark, melissa,
 codistilled melissa, "rectified" melissa, true melissa,
 menthol, methyl salicylate, absolute mimosa, mimosa,
 monarda, mugwort, musk seed, myrrh, myrtle, absolute
 20 narcissus, neroli (orange blossom), niaouli, nutmeg,
 extra nutmeg, oakmoss, absolute oak moss, olibanum,
 absolute opopanax, orange, bitter orange, blood orange,
 sweet orange, wild West Indian orange, oregano, orris
 root, concrete orris, osmanthus, palm oil, refined palm
 25 oil, palmarosa, paprika, parsley seed, patchouli, Indian
 patchouli oil, Indonesian patchouli oil, peanut, peanut
 oil, pecan oil, pennyroyal, pepper, black pepper, super
 black pepper, peppermint, India peppermint, USA baby
 mint peppermint, pet perfume, petitgrain (orange
 30 leaves), white pine, pine needle, evening primrose,

- ravensara anisata, true ravensara, ravensare,
 ravintsara, redberry, rosalina, rose, rose geranium,
 rose otto, Bulgarian rose, English rose, Turkish rose,
 rosehip seed oil, rosemary, rosemary anti-oxidant
 5 extract powder, rosemary verbenone, Morocco rosemary,
 Spain rosemary, rosewood, rosewood oil, rue, sage, white
 sage, sage dalmatian, sage officinalis, sage triloba,
 sandalwood, sassafras, seabuckthorn berry, sesame oil,
 sesame seed oil, shea butter, unrefined shea butter,
 10 spearmint, spikenard, green spikenard, spruce, St.
 John's wort, styrax resin, tagetes, tangerine, Dancy
 tangerine, tarragon, tea tree, Australia tea tree, thuja
 (cedar leaf), thyme, red thyme, thyme ct. linalool,
 thyme vulgaris, wild thyme, red thyme, thymol, mixed
 15 tocopherols, tolu balsam resin, absolute tuberose,
 tuberose, tumeric, valerian, vanilla, pure vanilla
 extract, vanilla bean, absolute vanilla bourbon,
 vegetable glycerin, absolute verbena, vetiver, violete
 leaves, vitex, organic Haiti vetiver, absolute violet
 20 leaf, walnut oil, wintergreen, natural wintergreen,
 wormwood, yarrow, ylang ylang, ylang ylang I, ylang
 ylang II, ylang ylang III, ylang ylang compound, ylang
 ylang complete, and ylang ylang extra.
- 25 54. The composition of claim 1 wherein the essential
 oil comprises at least one of menthol, camphor,
 eucalyptus oil, cedarleaf oil, nutmeg oil, thymol, and
 turpentine oil.

55. The composition of claim 1 wherein the essential oil is present in a total amount of up to about 90 wt.% of the composition.

5 56. The composition of claim 1 wherein the essential oil is present in a total amount of up to about 80 wt.% of the composition.

57. The composition of claim 1 wherein the essential
10 oil is present in a total amount of up to about 70 wt.% of the composition.

58. The composition of claim 1 wherein the essential oil is present in a total amount of up to about 60 wt.%
15 of the composition.

59. The composition of claim 1 further comprising water.

20 60. The composition of claim 1 further comprising at least one of petrolatum, mineral oil, ceresin, and lanolin alcohol.

61. The composition of claim 1 further comprising an
25 absorption enhancer.

62. The composition of claim 61 wherein the absorption enhancer comprises at least one of water, methanol, ethanol, 2-propanol, dimethyl sulfoxide, decylmethyl
30 sulfoxide, tetradecyl methyl sulfoxide, 2-pyrrolidone,

N-methyl-2-pyrrolidone, N-(2-hydroxyethyl) pyrrolidone, laurocapram, acetone, dimethyl acetamide, dimethyl formamide, tetrahydrofurfuryl alcohol, docusate sodium, sodium lauryl sulfate, quaternary ammonium salt,
5 lecithin, cephalin, alkylbetamine, monoglyceride, diglyceride, triglyceride, lauryl alcohol, cetyl alcohol, stearyl alcohol, sucrose, sorbitan, polyethylene glycol, urea, and N,N-diethyl-m-toluamide.

10 63. The composition of claim 1 further comprising a polyhydric alcohol selected from the group of glycerin, ethylene glycol, polyethylene glycol, propylene glycol, triethylene glycol, tetraethylene glycol, sorbitol, and combinations thereof.

15 64. The composition of claim 1 further comprising a skin protectant selected from the group of aloe, glycerin, calamine, Vitamin E, Vitamin E acetate, Vitamin C, allantoin, aluminum hydroxide gel, bismuth
20 subnitrate, boric acid, calamine, cocoa butter, dimethicone, glycerin, kaolin, live yeast cell derivative, petrolatum, pyridoxine hydrochloride, shark liver oil, sodium bicarbonate, sulfur, tannic acid, topical starch, mineral oil, ceresin, bisabolol,
25 panthenol, trolamine, white petrolatum, zinc acetate, zinc carbonate zinc oxide, zinc sulfate, and combinations thereof.

65. The composition of claim 1 further comprising an
30 anti-infective agent selected from the group of:

- [1R-(1R*, 3S*, 5R*, 6R*, 9R*, 11R*, 15S*, 16R*, 17R*, 18S*, 19E, 21E, 23E, 25E, 27E, 29E, 31E, 33R*, 35S*, 36R*, 37S*)]-33-[(3-Amino-3,6-dideoxy- β -D-mannopyranosyl)oxy]-1,3,5,6,9,11,17,37-octahydroxy-
 5 15,16,18-trimethyl-13-oxo-14,39-dioxabicyclo[33.3.1]nonatriaconta-19,21,23,25,27,29,31-heptaene-36-carboxylic acid (Amphotericin B);
 5-fluorocytosine (Flucytosine);
 2,4-difluoro- α,α^1 -bis(1H-1,2,4-triazol-1-ylmethyl)
 10 benzyl alcohol) (Fluconazole);
 griseofulvin microsize (Griseofulvin);
 (E)-N-(6,6-dimethyl-2-hepten-4-ynyl)-N-methyl-1-naphthalenemethanamine hydrochloride) (Terbinafine);
cis-1-acetyl-4-[4-[(2-(2,4-dichlorophenyl)-2-(1H-
 15 imadazol-1-ylmethyl)-1,3-dioxolan-4-yl] methoxyl]phenyl] piperazine (Ketoconazole);
 (\pm)-1-[(R*)-sec-butyl]-4-[p-[4-[p-[(2R*, 4S*)-2-(2,4-dichlorophenyl)-2-(1H-1,2,4-triazol-1-ylmethyl)-1,3-dioxolan-4-yl]methoxy]phenyl]-1-
 20 piperazinyl]phenyl]- Δ^2 -1,2,4-triazolin-5-one mixture with (\pm)-1-[(R*)-sec-butyl]-4-[p-[4-[p-[(2S*, 4R*)-2-(2,4-dichlorophenyl)-2-(1H-1,2,4-triazol-1-ylmethyl)-1,3-dioxolan-4-yl]methoxy]phenyl]-1-piperazinyl]phenyl]- Δ^2 -1,2,4-triazolin-5-one or (\pm)-1-[(RS)-sec-butyl]-4-[p-
 25 [4-[p-[(2R, 4S)-2-(2,4-dichlorophenyl)-2-(1H-1,2,4-triazol-1-ylmethyl)-1,3-dioxolan-4-yl]-methoxy]phenyl]-1-piperazinyl]phenyl]- Δ^2 -1,2,4-triazolin-5-one (Itraconazole);
 2-chloro-5-hydroxy-1,3-dimethylbenzene
 30 (Chloroxylenol);

- griseofulvin ultramicrosize (Griseofulvin);
 (E)-N-(6,6,-dimethyl-2-hepten-4-ynyl)-N-methyl-1-naphthalenemanamine hydrochloride (Terbinafine);
 6-cyclohexyl-1-hydroxy-4-methyl-2(1H)-pyridinone
 5 (Ciclopirox);
 N-4-tert-butyl-benzyl-N-methyl-1-naphthalenemethylamine hydrochloride (Butenafine hydrochloride);
 nystatin;
 10 (E)-N-(Cinnamyl-N-methyl-1-naphthalenemethylamine hydrochloride (Naftifine hydrochloride);
 2',4'-dichloro-2-imidazol-1-ylacetophenone (Z)-[O-(2,4-dichlorobenzyl)oxime] mononitrate (Oxiconazole nitrate),
 15 6-cyclohexyl-1-hydroxy-4-methyl-2(1H)-pyridone (Ciclopirox);
 selenium sulfide;
 (±)-1-[4-(p-chlorophenyl)-2-[(2,6-dichlorophenyl)thio]butyl] imidazole mononitrate
 20 (Butoconazole nitrate);
 ([1-(o-chloro-...-diphenylbenzyl) imidazole]) (Clotrimazole);
 (cis-1-[p-[[2-(2,4-dichlorophenyl)-2-(1H-1,2,4-triazol-1-ylmethyl)-1,3-dioxolan-4-yl] methoxy phenyl]-
 25 4-isopropyl-piperazine (Tercanazole);
 6-cyclohexyl-1-hydroxy-4-methyl-2(1H)-pyridone (ciclopirox);
 and combinations thereof.

66. An anti-fungicidal composition comprising a composition of claim 1 and a fungicidal excipient.
67. The composition of claim 1 which is a cream.
- 5 68. The composition of claim 1 which is a gel.
69. The composition of claim 1 which is an ointment.
- 10 70. The composition of claim 1 which is a lotion.
71. A therapeutic method for treating a mammal afflicted with a fungal infection comprising administering to the mammal, an effective anti-fungal amount of a composition of claim 1.
- 15 72. The method of claim 71 wherein the mammal is a human.
- 20 73. The method of claim 71 wherein the fungal infection is caused by a dermatophytic fungus.
74. The method of claim 73 wherein the dermatophytic fungus is *Microsporum canis*, *Microsporum gypseum*,
 25 *Microsporum audouinii*, *Trichophyton tonsurans*, *Trichophyton mentagrophytes*, *Epidermophyton floccosum*, *Trichophyton rubrum*, or *Pityrosporum ovale*.
75. The method of claim 71 wherein the fungal infection
 30 is caused by *Candida albicans* or *Candida guilliermoundi*.

76. The method of claim 71 wherein the fungal infection is caused by *Blastomyces dermatidis* or *Cryptococcus neoformans*.

5

77. The method of claim 71 wherein the fungal infection is present on a nail of the mammal, under the nail of the mammal, or a combination thereof.

10 78. The method of claim 71 wherein the fungal infection is present on a toe-nail of the mammal, under the toe-nail of the mammal, or a combination thereof.

15 79. The method of claim 71 wherein the fungal infection is present on the scalp of the mammal.

80. The method of claim 71 wherein the fungal infection is present on the vagina of the mammal, in the vagina of the mammal, or a combination thereof.

20

81. The method of claim 71 wherein the fungal infection is present on a skin surface of the mammal.

25 82. A method of inhibiting or killing a fungus comprising contacting the fungus with an effective anti-fungal amount of a composition of claim 1.

83. The method of claim 82 wherein the contacting is *in vitro*.

30

84. The method of claim 82 wherein the contacting is *in vivo*.

85. The method of claim 82 wherein the fungal infection
5 is present on plant tissue.

86. The method of claim 82 wherein the fungus is
present on turf grass.

10 87. The method of claim 82 wherein the fungus causes
the disease dollar spot or brown patch.

88. The method of claim 85 wherein the plant tissue
comprises bark, roots, leaves, flowers, needles, bulbs,
15 berries, rhizomes, rootstocks, stems, seeds, or any
combination thereof.